

# *Lolium rigidum* Gaudin (annual ryegrass) response to different doses of Clodinafop- propargyl in wheat crops

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**Abstract**— *Lolium rigidum* is a harmful weed specie in wheat crops. The aim of this study is to investigate the effect of Clodinafop-propargyl on *Lolium rigidum* infestation in a soft wheat crop. The experimental design was Randomized Complete Block Design (RCBD) with three replications. Each block contained 4 elementary plots, 3 plots of which were treated with three rates of application of Clodinafop-propargyl and one untreated control plot. Observations concerned Percentage of *Lolium rigidum* density reduction and biomass reduction. Results showed that treatments with Clodinafop-propargyl at 60 g/ha and 80 g/ha gave the best control of *Lolium rigidum* infestations recording respectively 95.1% and 96.8% of *Lolium rigidum* density reduction and 92.5% and 64.6% of *Lolium rigidum* dry biomass reduction. Clodinafop-propargyl at 40 g/ha recorded lower efficacies 65.7% and 61.9% respectively on *Lolium rigidum* density reduction, and *Lolium rigidum* dry biomass reduction.

**Keywords**— *Lolium rigidum*, Clodinafop-propargyl, wheat, density, biomass.

## I. INTRODUCTION

In Morocco, weeds reduce considerably cereal crop yields by competing with the crop for resources such water, minerals and sunlight (Zimadahl & El Brahli, 1992; Boutahar, 1994; Taleb, 1996; Bouhache, 2007; Bouhache, 2017). *Lolium rigidum* Gaudin (annual ryegrass) belongs to *Poaceae* botanical Family. It is an annual plant. Hairless. Upright, 20 to 70 cm high (Tanji, 2005). The underside of leaves is shiny and smooth, with a width of 2 to 6 mm. White and translucent ligules. uncrossed auricles. Spikes, 10 to 50 cm. Spiklets, 1 to 2 cm long, inserted into excavations of the rachis (stem) and equipped with 2 to 12 fertile flowers (Tanji, 2005). Glumes orally equal to or greater than the spels. Lower glumes usually without awns. Lanceolate oval, brown, hairless seeds seeds. Ventral surface is concave and the dorsal surface is convex. Seeds size are 4 to 7 mm long and 1 to 1.5 mm wide. Hairless seedling. First leaves of 4 to 7 cm x 1-2 mm, with shiny and smooth leaves on the underside, with a ligule of less than 1 mm. Auricles are absent or small, becoming visible from the third leaf (Tanji, 2005). Seed detection makes it easier to recognize the seedling. *Lolium rigidum* is a weed which is quite abundant throughout Morocco. It is existing on different soils and environments and consumed by animals. Some hybrids or varieties are used in Morocco to improve the production of rangelands and fallows (Tanji, 2005). Clodinafop-propargyl is a post emergent herbicide which belongs to Aryloxyphenoxy-

propionate 'FOPs' family. It is a systemic herbicide absorbed by leaves to control grasses. It causes inhibition of acetyl CoA carboxylase (ACCase) which is an enzyme that catalyzes the fatty-acid synthesis (Ezzahiri & al., 2017). Clodinafop-propargyl leads to the inhibition of ACCase enzyme activity, thus blocking the production of phospholipids necessary for synthesizing the lipid bilayer, which is indispensable for cell structure and function. *Lolium rigidum* is a harmful weed specie in cereal crops in Ouazzan region of Morocco. The aim of this study is to compare the effect of three doses of Clodinafop-propargyl on *Lolium rigidum* infestation in a soft wheat crop in the Ouazzan region of Morocco.

## II. MATERIAL AND METHODS

A weed control trial was conducted in Ouazzane region of Morocco during 2017-2018 growing season. The experimental design was Randomized Complete Block Design (RCBD) with three replications. The distance between the blocks was 2 meters and the distance between plots was 1 meter. Each block contained 4 elementary plots, 3 plots of which were treated with the post-emergence herbicides tested (Table 1) and one untreated control plot. The size of the elementary plots was 2m x 5m (10 m<sup>2</sup>). Treatments was carried out on January 2, 2018 with a Knapsack herbicide sprayer with nozzle delivering a 3 bar jet. The spray volume per hectare is 200L. Treatments consist on three rates of application of

Clodinafop-propargyl (Table 1). Observations were at 60 days after application of herbicides. Observations concerned Percentage of *Lolium rigidum* density reduction and biomass reduction. *Lolium rigidum* density reduction percentage= [*Lolium rigidum* density in control plots – *Lolium rigidum* density in treated plots] x 100 / [*Lolium rigidum* density in control plots], Calculation of the density at the experimental level of the plot was made by a quadrant of 1m x 1m. *Lolium rigidum* dry biomass reduction percentage= [*Lolium rigidum* dry biomass weight in control plots – *Lolium rigidum* dry biomass weight in treated plots] x 100 / [*Lolium rigidum* dry biomass weight in control plots], Calculation of dry *Lolium rigidum* biomass were made by collecting *Lolium rigidum* in each plot using a quadrant of 1m x 1m. Samples were dried in a drying oven at 75 ° C for 48 hours. Then, dry plant material in each plot were weighed with a precision balance. Statistical analyzes were performed with IBM SPSS Statistics, version 21.0 using the analysis of variance (ANOVA). The differences among treatment means was compared by Tukey's test at  $P=0.05$ .

Table 1: Applied herbicides in experimental site

Herbicide treatments	Herbicide active ingredient	rate of application (g/hectare)
Treatment 1	Clodinafop-propargyl	40 g/ha
Treatment 2	Clodinafop-propargyl	60 g/ha
Treatment 3	Clodinafop-propargyl	80 g/ha

### III. RESULTS AND DISCUSSION

#### Effect on *Lolium rigidum* density reduction

Statistical analysis revealed significant differences between treatments (Table 2). Results in Table 2 showed that the best *Lolium rigidum* density reduction was obtained by Clodinafop-propargyl at 60 g/ha and 80 g/ha recording respectively 95.1% and 96.8% of *Lolium rigidum* density reduction. Clodinafop-propargyl at 40 g/ha showed lower efficacy recording 65.7 % of *Lolium rigidum* density reduction (fig. 1).

Table 2: Effect of treatments on *Lolium rigidum* density reduction (%)

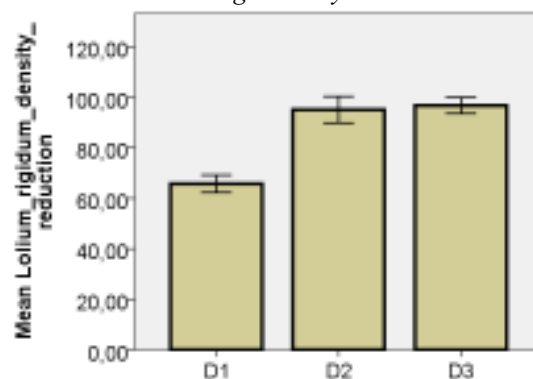
Doses	<i>Lolium rigidum</i> density reduction
Clodinafop-propargyl at 40 g/ha	65.7 <sup>a</sup>
Clodinafop-propargyl at 60 g/ha	95.1 <sup>b</sup>
Clodinafop-propargyl at 80 g/ha	96.8 <sup>b</sup>

at 80 g/ha

 $P\alpha = 0.05$ 

&lt;0.001

Significant differences within the same column and means followed by the same letter do not differ at  $P=0.05$  according to Tukey's test



D1: Clodinafop-propargyl at 40 g/ha; D2: Clodinafop-propargyl at 60 g/ha; D3: Clodinafop-propargyl at 80 g/ha  
Error Bars: 95% CI

Fig.1: Effect of treatments on *Lolium rigidum* density reduction (%)

#### Effect on *Lolium rigidum* dry biomass reduction

Statistical analysis revealed significant differences between treatments (Table 3). Data in Table 3 indicate that the best *Lolium rigidum* dry biomass reduction was achieved by Clodinafop-propargyl at 60 g/ha and 80 g/ha recording respectively 92.5% and 94.6% of *Lolium rigidum* dry biomass reduction. Concerning the effect of Clodinafop-propargyl at 40 g/ha, results showed lower efficacy recording 61.9% of *Lolium rigidum* dry biomass reduction (fig. 2).

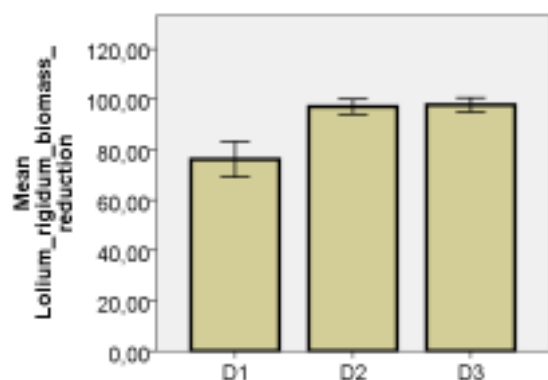
Table 3: Effect of treatments on *Lolium rigidum* dry biomass reduction (%)

Doses	<i>Lolium rigidum</i> density reduction
Clodinafop-propargyl at 40 g/ha	61.9 <sup>a</sup>
Clodinafop-propargyl at 60 g/ha	92.5 <sup>b</sup>
Clodinafop-propargyl at 80 g/ha	94.6 <sup>b</sup>

 $P\alpha = 0.05$ 

&lt;0.001

Significant differences within the same column and means followed by the same letter do not differ at  $P=0.05$  according to Tukey's test



D1: Clodinafop-propargyl at 40 g/ha; D2: Clodinafop-propargyl at 60 g/ha; D3: Clodinafop-propargyl at 80 g/ha  
Error Bars: 95% CI

Fig.2: Effect of treatments on *Lolium rigidum* dry biomass reduction (%)

#### IV. CONCLUSION

This study has shown that the herbicide Clodinafop-propargyl at 60 g/ha and 80 g/ha gave the best control of *Lolium rigidum*. Clodinafop-propargyl at 40 g/ha lower control of *Lolium rigidum*. Thus, Clodinafop-propargyl at 60 g/ha can be recommended to farmers in Ouazzane region when *Lolium rigidum* infestation is dominant.

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